white flecks about 1 mm. long giving them a whitish appearance; pellucid green, shining, with raised small pellucid tubercles, deltoid at tip, ovate, oblong.

Back. Keel in upper $\frac{1}{3}$ acute, with a few pellucid teeth spaced about 1 mm. apart on keel. Lower $\frac{2}{3}$ very rounded margins acute very minutely toothed up to half way below base of tip area.

End Awn 3—6 mm. long; persistent, reddish brown at base and middle, dull white at tip.

Peduncle. Flattened low down; simple, terete, 2 mm. in diam. and up to 40 cm. long including the raceme, light brown, sterile bracts about 20, 9 mm. long, the lowest 20 mm. from base of the peduncle;

Raceme up to 20 cm. long 2 mm. in diam. 20 spirally arranged flowers and buds, 4 open simultaneously.

Fertile Bracts. Bracts 6 mm. long, deltoid acuminate, white, papery, with a fine dark brown nerve.

Sterile Bracts. 20, up to 9 mm. long, white, with reddish brown nerve.

Pedicels 2 mm. long 2 mm. in diam. dark green.

Perianth. Greenish white, 13 mm. long. the cylindrical triangular base swelling 4 mm. in diam; constricted above ovary to 3 mm, ascending, straight. Segments free.

Upper Segments recurved about 90 degrees, channelled; face colour of inner segment pinkish white, with a broad light green nerve, narrow, obtuse, colour below, green. Face colour of the two outer, pinkish white, with a broad light green nerve; acute.

Lower Segments more recurved, face colour of inner segment pinkish white, with a fine greenish brown nerve, channelled, narrow; obtuse, face colour of two outer segments, white with a broad green nerve; deeply channelled, spreading, colour below, green.

Stamens 5 and 6 mm. long.

Style. White, 1 mm. long; at length exserted, ovary 4 mm. long 2 mm. in diam; green. Bent, capitate.

Type (C. L. Scott 72) in Nat. Herb. Pretoria.

Type locality. Cape Province; Riversdale District.

Distribution. Not further known.

This species is described from material collected by the author. It occurs on a very dry and stony hill, and under bushes in clusters up to 6 rosettes, to the east of Riversdale.

The plants grow well raised from the ground and are found in dense patches, and very proliferous from the base.

Compared with the accepted form of the species *Haworthia retusa* as accepted by Berger p. 100 in Das Pflanzenreich of 1908:—it is allied to that species in that the peduncle and raceme is the same in length and colour, it has the same number of sterile bracts, it is similar in shape and habits, and occurs in the same division. It has characters by which these two plants can easily and accurately be separated.

It is a much larger plant, with longer, broader and thicker leaves and more face lines on the end area. Minute teeth on both margins and keel, with the longitudinal white flecks more numerous on the face of the end area.

It has no reddish marks on its back or reddish nerve along its margins as in the case of the accepted *Haworthia retusa.* It has a much longer end awn, and is the most proliferous of all the described plants in the *Retusa* section. It is readily and easily identified by the large clusters it soon forms.

I have much pleasure in naming this attractive plant in honour of Mr. Gerald Graham Smith of the East London Museum for his excellent contribution to the genus Haworthia.

A RAPID AND SIMPLE METHOD FOR MEASURING THE EVAPORATING POWER OF THE AIR

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Introduction

A quantitative assessment of environmental factors is essential in modern ecology. Water is undoubtedly the most important factor in many habitats and an understanding of the water relations of vegetation is of the utmost importance, if the behaviour of the plants in the field is to be understood.

The ecologist is interested particularly in the evaporating power of the air, as it gives an insight into the water relations of plants. In general, he does not measure it frequently, as the conventional measuring methods are time-consuming and the calculation of evaporating power is complex and not necessarily accurate. However, evaporating power of the air yields more information on plant behaviour than either temperature, relative humidity or vapour pressure deficit measurements. The evaporating power of the air varies markedly, even between neighbouring communities where temperature differences may be slight.

This paper describes a simple and rapid method for measuring evaporating power of the air. No high degree of accuracy is claimed for this method and the complexity of the process of evaporation, especially in vegetation, is appreciated, but it notes the major factors involved and is very rapid. It makes possible the introduction of measurement of evaporating power of the air as routine background investigations in ordinary ecological work and on brief excursions in the field it enables comparative work on environmental factors to be undertaken.

To determine the evaporating power of the air, the following must be known:—*temperature*, *relative humidity*, *wind speed* and *barometric pressure*.

Temperature can be measured by an ordinary thermometer. Relative humidity is determined by wet and dry bulb thermometers, hair hygrometers or dew point apparatus. Wind speeds are readily measured by small portable anemometers, and barometric pressure can be measured by small aneroid barometers. All these measurements can be readily and rapidly made with equipment which is normally carried in the field.

Many ecologists collect humidity, temperature and wind data in the field, but due to the complexity of the calculations involved, make no effort to correlate these. As a result, they may easily overlook interesting aspects of the problem they are studying. Using the alignment chart (Fig. 1), it is possible to read off the evaporating power of the air in the field without any calculations, as long as the temperature, relative humidity, wind speed and barometric pressure are known.

Alignment Chart

This is a triple alignment chart, best drawn on a paper of foolscap size. On the left, the alignment of temperature (T) and relative humidity (R) gives the vapour pressure deficit (V) of the air. On the right, the alignment of barometric pressure (B) with the wind speed (u) gives the evaporation of water per unit area per millimeter of mercury difference in vapour pressure (e). By aligning (V) and (e), the evaporating power of the air (E), expressed in kilograms of water lost per square metre per hour from an open surface, can be read directly. This is the rate at which a free water surface would lose water under these conditions.

To simplify the process of reading the chart, a transparent ruler with a straight line engraved on it can be used.

Construction of the Alignment Chart

The first stage in the construction of the chart is to depict the relationship of temperature, relative humidity and vapour pressure deficit. If P is the pressure of saturated water vapour at any temperature T, and p is the partial pressure of water vapour at that same temperature and relative humidity R per cent, then the vapour pressure deficit V or (P–p) is equal to P (1-0·01R). Thus, a temporary log scale of P in millimetres of mercury and a permanent log scale of V in the same units are plotted as parallel lines. The number of inches per cycle in the log scales depends on the range of values contemplated and on the size of diagram desired, whereas the distance apart of the scales depends only on the size of the diagram. For instance, 8·87 in. and 4·23 in. per cycle respectively, and 2 in. apart serves in this case to secure a reasonable range of V. The third scale for (1-0·01R)—subsequently graduated in values of R—is created by inersection of related values on the P and V scales, or by calculating the position of some key points on it and graduating between them. The last step in this stage is to graduate the temporary log scale of P in terms of °C or °F, using a table of values of saturated vapour pressures against temperatures and erasing the unwanted P graduations.

The second stage is to relate evaporation in grams per square metre per hour per millimetre of mercury difference in vapour pressure (e) to wind velocity in feet per minute (u) and barometric pressure in millimetres of mercury (B). A simple relation of the form

$$e=(K/B)\ (1+u/m)$$

is acceptable for this purpose, where K, 1 and m are constants, assigned a value of 23,400, unity and 452 in this case (2), wherein the constant 23,400 refers to wind tunnel conditions, as in laboratory work, but may be amended for other condition, giving proportional adjustments in the value of (e) from the diagram. The same technique as above is used to construct the scales. It was convenient to establish log scales representing (e) at 7.6 in. per cycle and (B) at 39.5 in. per cycle, 2.5 in. apart and to construct the scale of (u) by intersection, in the first place in the form 23,400 $(1+u/452)$, later graduating in values of (u). This method appears to be easier here than calculating the position and dimensions of the (u) scale.

The third and final stage resembles the first. In the 2·5 in. left between the other two parts of the diagram is placed the scale (E), expressed in units of kilograms of water per square metre per hour, essentially a product function of the scales for (e) and (V). It may therefore be placed and graduated by intersection or calculation.

The use of the Alignment Chart

The uses of this chart vary, depending on the requirements of the experiment, but the following illustration may clarify how it can be used in ordinary ecological work. Some investigations were conducted in Happy Valley, Bain's Kloof, Cape Province, South Africa. A small stream flows down this mountain valley, and is flanked by a community of dense *Riverine Shrub* which is 10—25 ft. wide and about 5—7 ft. tall. This changes suddenly into a flat alluvial plain, the *Restionaceous Plain*, which is from 75—100 ft. wide. This gives way to a steep rocky slope covered in *Protea Shrub.* Despite their close proximity, these communities are distinct in general appearance and floristic composition. The small size of the valley makes it an admirable site for many ecological investigations, particularly for micro-climatic comparisons. Table I shows some of these. The figures cited are typical and no effort has been made to select a special set of readings which might be particularly easy to interpret.

The *Riverine Shrub* undoubtedly retains pockets of warm air over long periods and hence temperatures are frequently warmer than in the other two neighbouring communities which allow the free passage of air currents. Vigorous gusts of wind can, however, blow these warm air pockets away. Although transpiration is active and there is no shortage of water, insolation of the trapped air pocket may result in the relative humidity being fairly low in this vegetation. As Table I shows, the evaporating power of the air may be quite high. In fairly cool weather, the air of the *Riverine Shrub* is warmer than that of the other communities. Due to lack of constant wind, the evaporating power of the air is usually appreciably less than in the other communities. Both the *Restionaceous Plain* and the *Protea Shrub* are much drier environments for plants, even in cool weather when the temperature of these is usually lower